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EXAMINER	
PAUL, DISLER	

ART UNIT	PAPER NUMBER
2614	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PUSDKT@EM-LG.COM

<table>
<tr><td rowspan="2">Office Action Summary</td><td>Application No.
10/573,060</td><td colspan="2">Applicant(s)
SLAPAK ET AL.</td></tr>
<tr><td>Examiner
DISLER PAUL</td><td>Art Unit
2614</td><td></td></tr>
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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 03 December 2009.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-31 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-31 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

The Applicant's amended claims (1, 14, 17-18, 24, 31) as filed on 12/3/09 have been fully considered and are rejected over new prior art.

In regard to the amended independent claims (1, 18) , it is noted the new prior art as in *Klippel (US 5,694, 465)* does indeed disclose of such feature wherein "the noise destructive pattern has a non-linear relationship to the noise pattern sensed by an acoustic sensor" (fig.1 (1, 5-10, 11-12); col.3 line 58-67; col.4 line 1-25; col.5 line 10-30/the filter with transducer to produce non-linear distortion with the acoustic sensor) so as to compensate for the changes in the transducer parameters on-line. And further wherein "the noise destructive pattern is fully adaptive, wherein the noise destructive pattern comprises a fully adaptive nonlinear component" (fig.1 (1); col.4 line 1-25; col.5 line 10-30/such filter with controller is fully adaptive).

Similarly, in regard to claims (14, 24), Wan (US 5,978,489) teach of such feature as in "wherein the estimator is able to estimate a noise error corresponding to an anticipated destructive interference between a pattern of the noise and the noise destructive pattern at a predetermined location, wherein said predetermined location is distinct from a location of said acoustic sensor (Wan; fig.1; col.2 line 35-60; the estimator to **estimate error with *microphone (17)*** *is at*

a location near the loudspeaker is distinct ***from a location of the acoustic sensor (12****) which is close of the source noise signal which is correlated to the primary source*).

Similarly, in regard to claims (17, 31), the amended claims has been analyzed and rejected over prior art (see office action below).

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-14; 16; 18-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wan (US 5,978,489) and Wright (US 2003/0103635 A1) and Klippel (US 5,694, 476).

Re claim 1, Wan disclose of the active noise control system for controlling noise produced by a noise source, said system comprising: an acoustic sensor to sense a noise pattern and to produce a noise signal corresponding to the sensed noise pattern and an estimator and an acoustic transducer to produce a noise destructive pattern based on said noise signal (fig. 1 (01, 12, 14, 16); col.1 line 40-50; col.2 line 30-60).

But, Wan fail to disclose of the specific wherein having an estimator to produce a predicted noise signal by applying an estimation function to said noise signal; and to produce a noise destructive pattern based on said predicted noise signal. But, Wright et al. disclose of a system wherein the similar concept of having an

estimator to produce a predicted noise signal by applying an estimation function to said noise signal; and to produce a noise destructive pattern based on said predicted noise signal (fig.1 (102, 1-3); fig.3; par[0038-0042,0070-0072,0080; 0083; 0085]/ parameters <u>Ntf and fs are used in the estimate functions for noise destruction</u>). Thus, it would have been obvious for one of the ordinary skill in the art to have modify the combination with the predicted noise signal by applying an estimation function to said noise signal; and to produce a noise destructive pattern based on said predicted noise signal for purpose of cancelling noise in large area and outdoor/unconfined locations and maximizing the sound cancellation.

The combined teaching of Wan and Wright as a whole, failed to disclose of such wherein the noise destructive pattern has a non-linear relationship to the noise pattern sensed by the acoustic sensor. But, Klippel disclose of a system wherein the noise destructive pattern has a non-linear relationship to the noise pattern sensed by an acoustic sensor (fig.1 (1, 5-10, 11-12); col.3 line 58-67; col.4 line 1-25; col.5 line 10-30/the filter with transducer to produce non-linear distortion with the acoustic sensor) so as to compensate for the changes in the transducer parameters on-line. Thus, it would have been obvious for one of the ordinary skill in the art to have modified the prior art with implementing noise destructive pattern has a non-linear relationship to the noise pattern sensed by

the acoustic sensor so as to compensate for the changes in the transducer parameters on-line.

Thus, the combined teaching of Wan and Wright and Klippel as a whole, further disclose of wherein the noise destructive pattern is fully adaptive, wherein the noise destructive pattern comprises a fully adaptive nonlinear component (fig.1 (1); col.4 line 1-25; col.5 line 10-30/such filter with controller is fully adaptive).

The combined teaching of Wan and Wright and Klippel as a whole, disclose of wherein the sensor comprises a plurality of acoustic sensor units being correlated to said noise source (Wan; fig.1 (12); col.2 line 37-39/plurality of acoustic correlated sensors may be used).

Re claim 2, the system of claim 1, wherein said estimator is able to adapt one or more parameters of said estimation function based on a noise error at a predetermined location (fig.1-2 (3, 102); par [0069-0070]/adaptive parameters based on noise error for error sensor at such predetermined location).

Re claim 3, the system of claim 2, wherein said noise error comprises an anticipated destructive interference between said noise pattern and

said noise destructive pattern at said predetermined location (fig.1-2; par [0022-3,0078])/all including error within such plane).

RE claim 4, the system of claim 2 comprising an error-sensing microphone to sense said noise error at said predetermined location. (fig.1(17); col.2 line 47-60).

Re claim 5, the system of claim 2 comprising an error evaluator to evaluate said noise error based on said noise signal and said predicted noise signal (fig.1-2; par [0069,0073]/update based on noise and predict).

Re claim 6, the system of claim 5, wherein said error evaluator comprises: a speaker transfer function module to produce an estimation of said noise destructive pattern by applying a speaker transfer function to said predicted noise signal; a modulation transfer function module to produce an estimation of said noise pattern at said predetermined location by applying a modulation transfer function to said noise signal; and a subtractor to subtract the estimation of said noise destructive pattern from the estimation of said noise pattern (fig.2; par [0069,0070]).

Re claim 7, the system of claim 2, wherein said estimator is able to adapt said one or more parameters based on a predetermined criterion (par [0070]).

Re claim 8, the system of any one of claim 7, wherein said estimator is able to reduce said error value by adapting said one or more parameters (fig.1-2; wt error mic; par [0035,0069-0070]/to have error at minimum).

Re claim 9, the system of claim 8, wherein said adaptive estimator is able to minimize said error value by adapting said one or more parameters (see claim 8 rejection).

Re claim 10, the system of claim 2, with the parameters as disclosed , wherein said one or more parameters comprise at least one parameter selected from the group consisting of a center parameter, an effective radius parameter, and an intensity parameter (par [0070]/with radius parameter).

Re claims 11, the system of claim 10, wherein said estimator is able to adapt the estimated parameters, but, the combined teaching of Wan and Wright et al. and Klippel et al. as a whole, fail to disclose of the specific wherein having a center parameter based on the following equation: c k .function. (n + 1) = c k .function. (n) - .mu. c .times. e .function. (n) .times. w k .times. s = 0 S - 1 .times. .times. STF .function. (s) .times. f k .function. [n - s] .times. (1 .upsilon. k

.times. i = 0 L - 1 .times. .times. (x .function. (n - i) - c k .function. (i))) wherein c.sub.k(n+1) denotes an adapted value of said center parameter, c.sub.k(n) denotes a current value of said center parameter, w.sub.k denotes said intensity parameter, L denotes a predetermined number of samples of said noise signal, STF denotes a predetermined speaker transfer function, S denotes a predetermined speaker transfer function frequency parameter, .mu..sub.c denotes a predetermined convergence parameter corresponding to said center parameter, v.sub.k denotes said effective radius parameter, e(n) denotes said noise error, f.sub.k denotes a predetermined function, and x(n) denotes an n-th sample of said noise signal. However, it is noted the concept of having the above equations for defining the center parameters is simply an obvious conversion of well known algorithm formula for defining the center parameter so as to similarly obtain the reduction signal, thus, it would have been obvious for one of the oridinary skill in the art to have modified the combination with further incorporating the equation as being a center parameter based on the following equation: c k .function. (n + 1) = c k .function. (n) - .mu. c .times. e .function. (n) .times. w k .times. s = 0 S - 1 .times. .times. STF .function. (s) .times. f k .function. [n - s] .times. (1 .upsilon. k .times. i = 0 L - 1 .times. .times. (x .function. (n - i) - c k .function. (i))) for obtaining the noise reduction signal.

Similarly Re claim 12-13 with respect to radius and intensity parameters have been analyzed and rejected with respect to claim 11.

Re claim 14, the system of claim 1, the combined teaching of Wan and Wright et al. and Klippel et al. as a whole, teach of wherein said estimation function comprises a non-linear estimation function, wherein the estimator is able to estimate a noise error corresponding to an anticipated destructive interference between a pattern of the noise and the noise destructive pattern at a predetermined location, wherein said predetermined location is distinct from a location of said acoustic sensor (Wan; fig.1; col.2 line 35-60; the estimator to **estimate error with *microphone (17)*** *is at a location near the loudspeaker is distinct* ***from a location of the acoustic sensor (12****) which is close of the source noise signal which is correlated to the primary source*).

Re claim 16, the system claim 1, wherein said acoustic sensor comprises a microphone, and wherein the noise destructive pattern produced by the acoustic transducer has an exponential relationship to the noise pattern sensed by the acoustic sensor (fig.3; col.5 line 10-36/such relationship to the exponential power of zero is merely same non-linear relationship thus indeed it does have such exponential relationship).

Re claim 18, Wan disclose of the active noise control system for controlling a noise produced by a noise source, said system comprising: a primary acoustic sensor to sense a noise pattern and to produce a corresponding primary noise signal ; at least one secondary acoustic sensor to sense a residual noise pattern and to produce at

least one secondary noise signal corresponding to the residual noise pattern sensed by said at least one secondary acoustic sensor, respectively (fig.1 (12,16); col.2 line 45-60), wherein said secondary acoustic sensor is separated from said noise source by a distance larger than a distance between said primary acoustic sensor and said noise source (col.2 line 35-55; fig.1 (12,16)/pick up by first microphone and propagate down to be pick up by secondary sound mic with larger distance) and a controller with an acoustic transducer to produce a noise destructive pattern based on said primary noise signal and said at least one secondary noise signal(fig.1 (10,14).

But, Wan fail to disclose of the controller with specifically being functionally associated with an acoustic transducer and a primary estimator to produce a predicted noise signal, wherein said controller is adapted to produce noise destructive pattern based on said primary noise signal and said at least one secondary noise signal and said predicted noise signal.

But, Wright disclose of a noise active cancellation system wherein the controller being functionally associated with an acoustic transducer and a primary estimator to produce a predicted noise signal, wherein said controller is adapted to produce noise destructive pattern based on said primary noise signal and said at least one secondary noise signal and said predicted noise signal

(fig.1 (102,1-3); fig.3; ; par [0069; 0070-0071]/ wt parameters such as Ntf and fs partly to help estimate).

Thus, it would have been obvious for one of the ordinary skill in the art to have modify the combination with the controller being functionally associated with an acoustic transducer and a primary estimator to produce a predicted noise signal, wherein said controller is adapted to produce noise destructive pattern based on said primary noise on said primary noise signal and said at least one secondary noise signal and said predicted noise signal for purpose of cancelling noise in large area and outdoor/unconfined locations and maximizing the sound cancellation.

The combine teaching of Wan and Wright as a whole, fail to disclose of wherein the noise destructive pattern produced by the controller has a non-linear relationship to the noise pattern sensed by the primary acoustic sensor. But, Klippel disclose of a system wherein the noise destructive pattern produced by the controller has a non-linear relationship to the noise pattern sensed by the primary acoustic sensor (fig.1 (1, 5-10, 11-12); col.3 line 58-67; col.4 line 1-25; col.5 line 10-30/the filter with transducer to produce non-linear distortion with the acoustic sensor) so as to compensate for the changes in the transducer parameters on-line. Thus, it would have been obvious for one of the ordinary skill in the art to have modified

the prior art with implementing wherein the noise destructive pattern produced by the controller has a non-linear relationship to the noise pattern sensed by the primary acoustic sensor so as to compensate for the changes in the transducer parameters on-line.

The combine teaching of Wan and Wright and Klippel as a whole, further teach of wherein the noise destructive pattern is fully adaptive and wherein the noise destructive pattern comprises a fully adaptive non linear component (fig.1 (1); col.4 line 1-25; col.5 line 10-30/such filter with controller is fully adaptive) and wherein the primary acoustic sensor comprises a plurality of acoustic sensor units being correlated to said noise source (Wan; fig.1 (12); col.2 line 37-39/plurality of acoustic sensors may be used).

Re claim 19, the system of claim 18 with the controller, wherein said primary estimator is adapted to produce a predicted primary signal by applying a primary estimation function to said primary noise signal (par [0070-0071; 0080,0083]/herein estimator for noise signal).

But, they fail to disclose of the further comprising at least one secondary estimator to produce at least one predicted secondary signal by applying at least one secondary estimation function to said at least one secondary noise signal, respectively. But, it is noted the concept of it would have been obvious for one of the ordinary skill in

the art to have combined the estimator and further in combination with such a secondary estimator to produce at least one predicted secondary signal by applying at least one secondary estimation function to said at least one secondary noise signal as per designer’s need for similarly maximizing the sound cancellation.

Re claim 20, the system of claim 19, wherein said primary estimator is able to iteratively adapt one or more parameters of said primary estimation function based on a noise error (fig.102 (3); par [0069-0070]).

Re claim 21, the system of claim 19, wherein said at least one secondary estimator is able to iteratively adapt one or more parameters of said at least one secondary estimation function, respectively, based on a noise error (fig.102 (5); par [0069-0070]).

Re claim 22, the system claim 19, wherein said controller is able to control said acoustic transducer based on a combination of said predicted primary signal and said at least one predicted secondary signal (fig.2, par [0069-0070]).

Re claim 23, the system of claim 22, wherein said controller is able to control said acoustic transducer based on the sum of said predicted

primary signal and said at least one predicted secondary signal (see claim 22 rejection).

Claim 24, the system claim 20, wherein said controller comprises a noise error evaluator to evaluate a noise error corresponding to an anticipated destructive interference between a pattern of the noise and the noise destructive pattern at a predetermined location, wherein said predetermined location is distinct from locations of said primary and secondary acoustic sensors (Wan; fig.1; col.2 line 35-60; the estimator to **estimate error with *microphone (17)*** *is at a location near the loudspeaker is distinct* ***from a location of the acoustic sensor (12)*** *which is close of the source noise signal which is correlated to the primary source*).

Re claim 25, the system of claim 24, wherein said noise error evaluator is able to evaluate said noise error based on said primary noise signal, said at least one secondary noise signal and said predicted primary signal(fig.3 (3)/primary, predict and secondary noise).

Re claim 26, the system of claim 25, wherein said noise error evaluator comprises: a speaker transfer function module to produce an

estimation of a primary part of said noise destructive pattern corresponding to said predicted primary signal by applying a speaker transfer function to said predicted primary signal; a modulation transfer function module to produce an estimation of said noise pattern by applying a modulation transfer function to a combination of said primary noise signal and said at least one secondary noise signal; and a subtractor to subtract the estimation of the primary part of said noise destructive pattern from the estimation of said noise pattern (see claim 6 rejection).

Re claim 27, the system of claim 24, wherein said controller comprises at least one residual noise evaluator to evaluate at least one residual noise (par [0045]).

Re claim 28, the system of claim 27, wherein said at least one residual noise evaluator is able to evaluate said residual noise based on said noise error and said at least one predicted secondary signal, respectively[fig.2; par [0045]/wt feedback}.

Re claim 29, the system of claim 28, wherein said residual error evaluator comprises: a speaker transfer function module to produce an estimation of a secondary part of said noise destructive pattern corresponding to said predicted secondary signal by applying a speaker transfer function to said predicted secondary signal; a subtractor to subtract the estimation of the secondary part of said noise

destructive pattern from said noise error (fig.1 (2-3); par [0069-0070]/wt error subtract with speaker for secondary signal).

RE claim 30, the system of claim 18, wherein at least one of said primary acoustic sensor and said at least one secondary acoustic sensor comprises a comprises a microphone, microphone, and wherein the noise destructive pattern produced by the acoustic transducer has an exponential relationship to the noise pattern sensed by the primary acoustic sensor (fig.3; col.5 line 10-36/such relationship to the exponential power of zero is merely same non-linear relationship and thus indeed have such exponential relationship).

3. Claims 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wan (US 5978489) and Wright (US 2003/0103635 A1) and Klippel (US 5,694, 476) and Dance et al. (US 6,944304 B1).

Re claim 15, the system of claim 14, but, the combined teaching of Wan and Wright et al. and Klippel as a whole, never specify of wherein said non-linear function comprises a radial basis function.

But, Dance et al. disclose of a noise signal in which having such non-linear function comprises a radial basis function (col.7 line 12-30) so as to estimate clean and noise signal in reducing the impulse noise signal. Thus, it would have been obvious for one of the ordinary

skills in the art to have modified the combination with incorporating the non-linear function comprises a radial basis function so as to estimate the clean and noise signal in reducing the impulse noise signal.

4. Claims 17, 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wan (US 5978489) and Wright (US 2003/0103635 A1) and Klippel (US 5,694, 465) and Kakuhari et al. (US 2002/0080978 A1).

Claim 17, the system of claim 1, wherein said acoustic transducer comprises a speaker (fig.1 (14)/transducer is a speaker); and wherein said acoustic sensor comprises an array of two or more microphones (fig.1 (12); fig.3; col. 2 line 36-39/many microphones may be used as the acoustic sensor).

However, the combined teaching of the combined teaching of Wan and Wright and Klippel as a whole, fail to disclose of wherein such microphone as being located in two or more respective locations. But, Kakuhari et al. disclose of the similar concept of correlation wherein having wherein the microphone as being located in two or more respective locations (fig.15-16 (45); par [0068-0069, 0080]) so as to detect noise signal from a plurality of points in the noise area. thus, it would have been obvious for one of the ordinary skill in the art to have modified the combined prior art with implementing the

microphone as being located in two or more respective locations so as to detect noise signal from a plurality of points in the noise area.

The combined teaching of Wan and Wright and Klippel and Kakuhari et al. as a whole, further disclose of wherein the two or more microphones are adapted to achieve coherence between the sensed noise pattern and the noise produced by the noise source, by taking into account at least one or more of: geometric structure of a path between said microphones and the noise source; aerodynamic attributes of the path between said microphones and the noise source; surface roughness along the path between said microphones and the noise source; turbulent airflow along the path between said microphones and the noise source; **formation of acoustic signals along the path between said microphones and the noise source** (fig.1 (11,12,10); fig.3; col.36-39; col.3 line 17-23/the array of two microphones are adapted to achieve coherence of the noise signal as received by the microphone based on the formation of acoustic signal received).

Similarly, Re claims 31 which cite the similar claim limitation as in claim 17 has been analyzed and rejected accordingly.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DISLER PAUL whose telephone number is (571)270-1187. The examiner can normally be reached on 7:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chin Vivian can be reached on 571-272-7848. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. P./
Examiner, Art Unit 2614

/Xu Mei/
Primary Examiner, Art Unit 2614